CLAIMS

1. A centrifugal compressor unit of the type comprising a motor means (50) rotationally driving a rotor (52) and at least one compressor comprising a stator body and a set of impeller wheels (56) which are mounted on a driven shaft rotationally driven by the rotor in the stator body, the entity consisting of the motor and the or each compressor being mounted in a common housing (86) sealed against the gas handled by the compressor unit, the compressor unit further comprising a set of active bearings (60, 62, 64, 66, 67) for axially and radially guiding the rotor on the driven shaft and cooling means for cooling the motor means and the guide bearings by tapping off some of the gas handled by the compressor at the outlet from a first compression stage (56), passing said gas through the motor means (50) and through the bearings and reinjecting the gas into the inlet side of the compressor, characterized in that the cooling means comprise a set of internal passages (88, 92, 94, 104) for feeding the motor means and the bearings with cooling gas which are formed in the compressor unit, the flow of cooling gas in the motor means (50) being separate from the flow of cooling gas in the bearings (60, 62, 64, 66) and converging upstream of the first compression stage.

2. The centrifugal compressor unit as claimed in claim 1, characterized in that the cooling means further comprise a set of external lines (80-1, 80-2, 80-3, 80-4, 80-5, 80-6) collecting the gas on the outlet side of the first compression stage and feeding the internal passages in parallel.

3. The centrifugal compressor unit as claimed in claim 2, characterized in that the internal passages (80-1, 80-2) for feeding the motor means are fed in

parallel with the internal passages (80-3, 80-4, 80-5, 80-6) for feeding the bearings with cooling gas.

4. The centrifugal compressor unit as claimed in any one of claims 1 to 3, characterized in that the cooling means are equipped with filtering means (82) for filtering the gas handled by the compressor.

5. The centrifugal compressor unit as claimed in any one of claims 1 to 4, characterized in that, with the driven shaft of the compressor supported by two end radial bearings (64, 66), the cooling means comprise an axial passage (104) running from one bearing to the other and fed at one of its ends by the external lines, said axial passage globally running longitudinally and radially externally through the compressor.

6. The centrifugal compressor unit as claimed in any one of claims 1 to 5, characterized in that the internal passages for feeding the bearings comprise a set of directional passages (94) directed radially externally in the compressor and each feeding one bearing.

7. The centrifugal compressor unit as claimed in any one of claims 1 to 6, characterized in that the motor is fed with cooling gas via an orifice (92) formed in an end cover (90) and in communication with an external line.

8. The centrifugal compressor unit as claimed in claim 7 dependent on claim 6, characterized in that the flow of cooling gas is mixed with the flow of cooling gas leaving the bearings cooled by the gas coming from the internal passages.

9. The centrifugal compressor unit as claimed in any one of claims 1 to 8, characterized in that it comprises means (105) for regulating the refrigeration

flow rate for the motor on the one hand and for each bearing on the other.

10. The centrifugal compressor unit as claimed in any one of claims 1 to 9, characterized in that it comprises means (108) for collecting flows of cooling gas from members situated on the same side as an equalizing piston (107).